Spot Safety Project Evaluation

Project Log # 200703098

Spot Safety Project # 10-01-200

Spot Safety Project Evaluation of the Traffic Signal Installation
At the Intersection of Ballantyne Commons Parkway and SR 5700 (Tom Short Rd)
City of Charlotte, Mecklenburg County

Documents Prepared By:

Safety Evaluation Group
Traffic Safety Systems Management Section
Traffic Engineering and Safety Systems Branch
North Carolina Department of Transportation

Principal Investigator

_____ 9-13-2007
Jason B. Schronce Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 10-01-200 – The Intersection of Ballantyne Commons Parkway and SR 5700 (Tom Short Rd) in Mecklenburg County, located within the city of Charlotte.

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the installation of an actuated traffic signal. SR 5700 (Tom Short Road) intersects Ballantyne Commons Parkway to form a tee intersection just south of I-485 in South Charlotte. Both roads are two-lane facilities with posted speed limits of 45 mph.

The original statement of problem was that there are insufficient gaps in the high volume roadway to provide safe entry by motorists on side street, resulting in collisions and congestion. Signal warrants 1, 2, 8, 9, and 11 were all met.

The initial crash analysis was completed from May 1, 1997 to May 1, 2000 with fourteen (14) reported crashes, eight (8) of which were deemed correctable with the installation of the signal. The final completion date for the improvement at the subject intersection was on January 31, 2002 with a total cost of $34,500.00.

Naive Before and After Analysis

After reviewing the spot safety project file folder along with all the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period was from November 1, 2001 to April 30, 2002. The before period consisted of reported crashes from March 1, 1997 through October 31, 2001 (4 years and 8 months) and the after period consisted of reported crashes from May 1, 2002 through December 31, 2006 (4 years and 8 months). The ending date for this analysis was determined by the available crash data at the time of evaluation.

The treatment data consisted of all crashes within 150 feet of the subject intersection. *Please see attached location map and photos for further details.*

The following data table depicts the Naive Before and After Analysis for the treatment location. Please note that Frontal Impact Crashes were the target crashes for the applied countermeasure. The Frontal Impact Crash types considered are as follows: Left turn, same roadway; Left turn, different roadways; Right turn, same roadway; Right turn, different roadways; Head on; and Angle.

Treatment Information			
	Before	**After**	**Percent Reduction (-) Percent Increase (+)**
Total crashes	23	12	- 47.83 %
Total Severity Index	9.52	1.62	- 82.98 %
Target Crashes	9	0	- 100.00 %
Target Crash Severity Index	18.67	0.00	- 100.00 %
Volume	20,300	19,900	- 1.97 %
Injury Crash Summary			
Fatal injury Crashes	0	0	N/A
Class A injury Crashes	2	0	- 100.00 %
Class B injury Crashes	0	0	N/A
Class C Injury Crashes	6	1	- 83.33 %
Total Injury Crashes	8	1	- 87.50 %

The naive before and after analysis at the treatment location resulted in a 48 percent decrease in Total Crashes, complete elimination of Target Crashes, and an 83 percent decrease in the Total Severity Index. The before period ADT year was 1999 and the after period ADT year was 2004.

Results and Discussion

The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 48 percent decrease in Total Crashes and complete elimination of Target Crashes. The summary results above demonstrate that both Total Crashes and Target Crashes appear to have decreased at the treatment location from the before to the after period.

Referencing the *Collision Diagram*, the Frontal Impact target crashes at the intersection in the before period were the result of a vehicle turning left onto Ballantyne Commons Parkway from SR 5700 due to insufficient gaps in traffic. After the signal installation, this pattern was completely eliminated. The signal was extremely effective in reducing the number and severity of crashes at the intersection. The overall severity index was reduced by 83 percent and the number of injury crashes decreased by 87.5 percent.

There was a slight increase in Rear-End Crashes at the intersection (from 8 to 10). Rear-End crashes involving southbound traffic reduced slightly while a crash pattern of four (4) Rear-End collisions developed northbound on Ballantyne Commons.

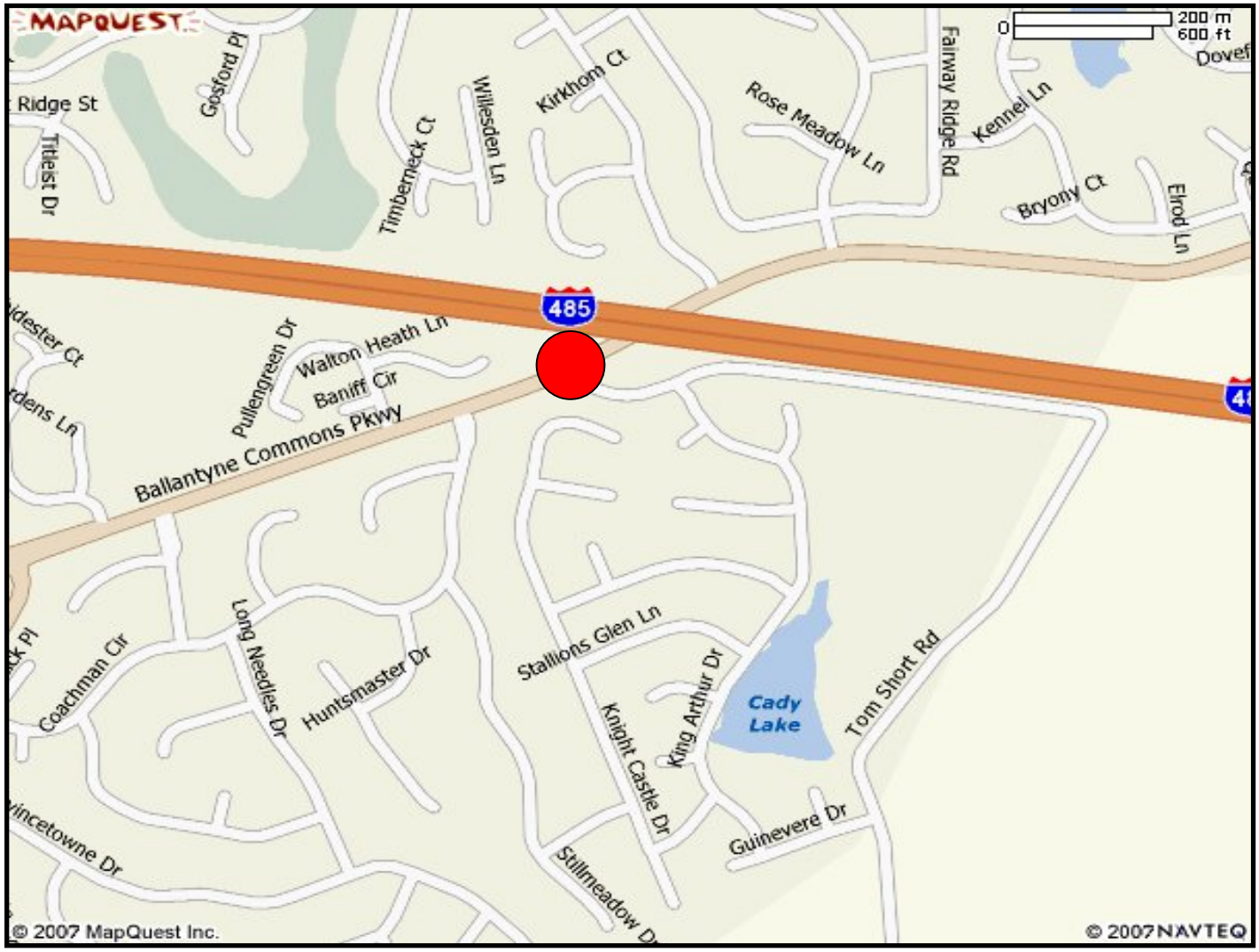
During our field investigation, the Safety Evaluation Group observed multiple drivers using the paved shoulder on the southbound side to maneuver around vehicles waiting to turn left onto Tom Short Road. Since this intersection is located in close proximity of the bridge over I-485, it does not appear to be enough room to add a left turn lane and could explain the extra shoulder pavement at this location.

The calculated benefit to cost ratio for this project is 29.44 considering total crashes. The benefit to cost ratio considering only target crashes is 27.73. The benefits are calculated using the change in annual crash costs from the before to the after period. Operational and other benefits related to the project are not considered in this analysis. The costs of the project include the actual construction costs as well as the increase in annual maintenance and utility costs.

Please see the attached *Treatment Site Photos*. Photos are provided for all approaches to the treatment intersection. Also, photos are supplied showing the passing maneuver conducted by southbound motorists traveling on Ballantyne Commons as they use the paved shoulder to pass vehicles waiting to turn left onto Tom Short Road.

As the Safety Evaluation Group completes additional spot safety reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors for this type of intersection.

Location Map
Mecklenburg County, City of Charlotte
Evaluation of Spot Safety Project # 10-01-200



Treatment Location: Ballantyne Commons Parkway at SR 5700 (Tom Short Rd)

TREATMENT SITE PHOTOS TAKEN 8/28/2007

Traveling North on Ballantyne Commons Parkway

Traveling North on Ballantyne Commons Parkway

Traveling South on Ballantyne Commons

Traveling South on Ballantyne Commons

Traveling West on SR 5700 (Tom Short Road)

Traveling West on SR 5700 (Tom Short Road)

Traveling West on SR 5700 (Tom Short Road)

SB Vehicle using shoulder to move around left turning motorist

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: Ballantyne at SR 5700 | BY: JBS
COUNTY: Mecklenburg | DATE: 9/5/2007
FILE NO.: SS 10-01-200 | NOTES: Total Crashes

DETAILED COST: TYPE IMPROVEMENT - New Signal

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	$34,500	10	0.149	$5,142
	$0	0	0.000	$0
Right-of-Way	$0	0	0.000	$0
TOTALS	$34,500	10	0.149	$5,142

ESTIMATED INCREASE IN ANNUAL MAINT. COST = $2,000
ESTIMATED INCREASE IN ANNUAL UTILITY COST = $900

TOTAL ANNUAL COST= $8,042
TOTAL COST OF PROJECT= $34,500

COMPREHENSIVE COST REDUCTION:

		ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES						
TIME PERIOD	YEARS	K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	ANNUAL COSTS
BEFORE	4.67	2	0.43	6	1.28	15	3.21	$249,786
AFTER	4.67	0	0.00	1	0.21	11	2.36	$13,041

Annual Benefits from Crash Cost Savings $236,745

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = $228,704

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 29.44

TOTAL COST OF PROJECT - $34,500 **COMPREHENSIVE B/C RATIO - 29.44**

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: Ballantyne at SR 5700 | BY: JBS
COUNTY: Mecklenburg | DATE: 9/5/2007
FILE NO.: SS 10-01-200 | NOTES: Target Crashes

DETAILED COST: TYPE IMPROVEMENT - New Signal

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TOTALS	$34,500	10	0.149	$5,142

ESTIMATED INCREASE IN ANNUAL MAINT. COST = $2,000
ESTIMATED INCREASE IN ANNUAL UTILITY COST = $900

TOTAL ANNUAL COST= $8,042
TOTAL COST OF PROJECT= $34,500

COMPREHENSIVE COST REDUCTION:

ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

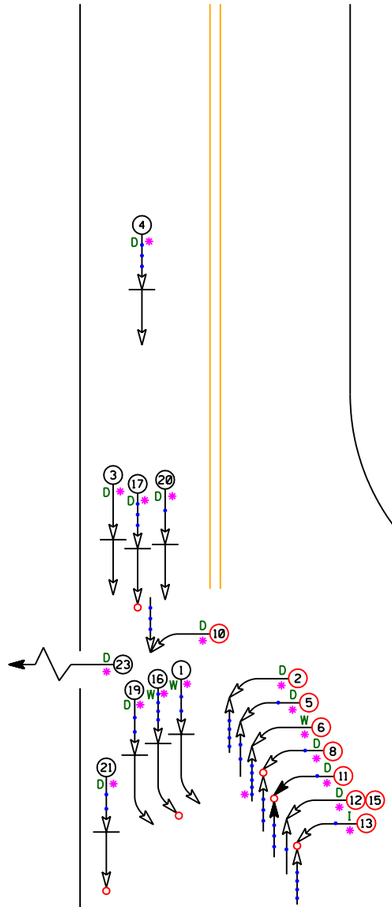
TIME PERIOD	YEARS	K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	ANNUAL COSTS
BEFORE	4.67	2	0.43	1	0.21	6	1.28	$222,998
AFTER	4.67	0	0.00	0	0.00	0	0.00	$0

Annual Benefits from Crash Cost Savings $222,998

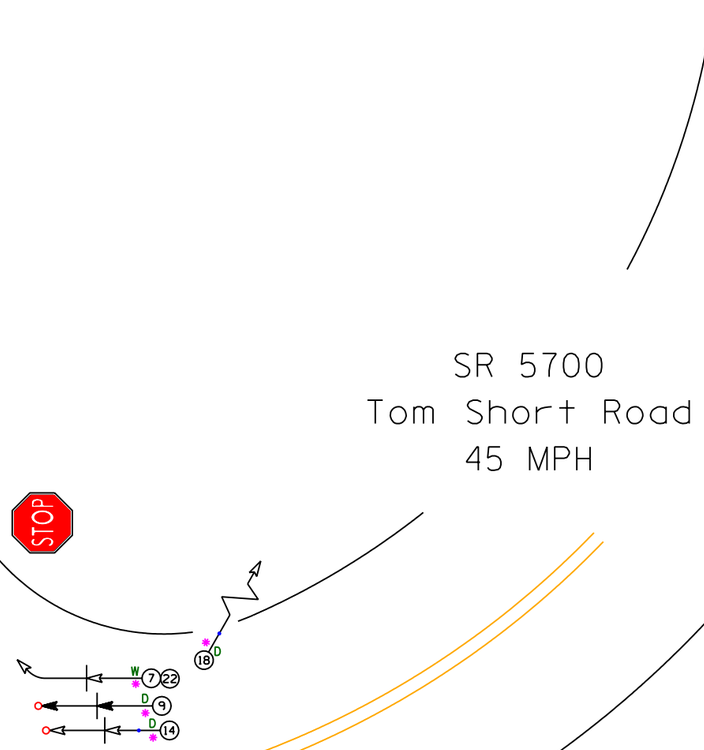
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = $214,956

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 27.73

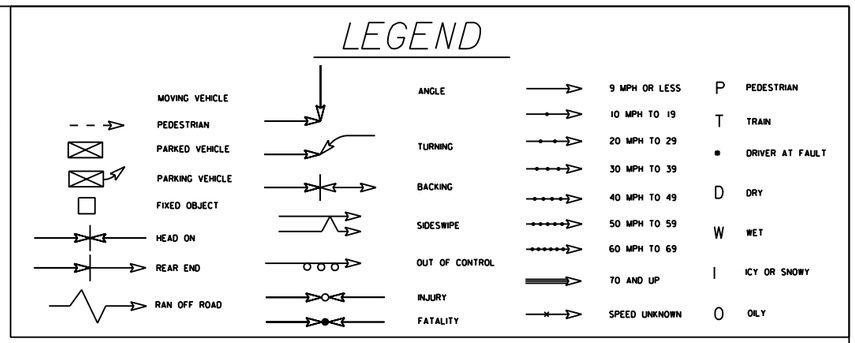
TOTAL COST OF PROJECT - $34,500 **COMPREHENSIVE B/C RATIO - 27.73**

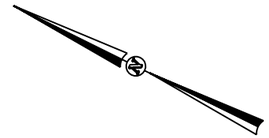


SR 3626
Ballantyne Commons Pkwy
45 MPH



SR 5700
Tom Short Road
45 MPH





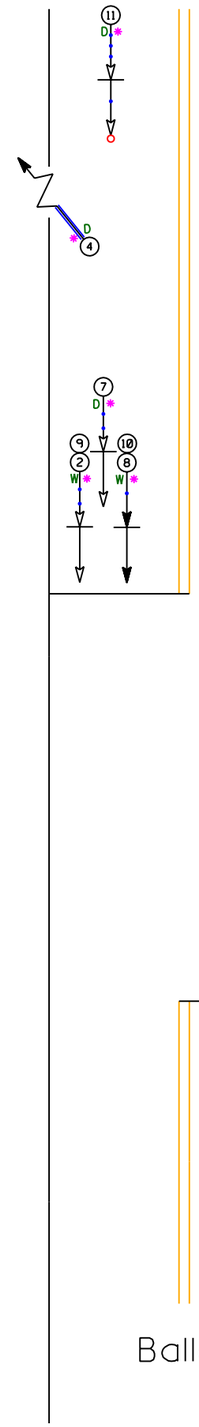
SS# 10-01-200
Mecklenburg County
Before Period
3/1/97 - 10/31/01
Ballantyne Commons
at Tom Short

(#) Target Crashes

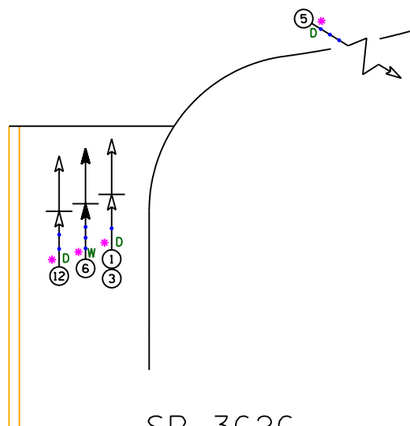
TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

COLLISION DIAGRAM	
DIVISION: 10	AREA:
STUDY PERIOD: 3/1/1997 TO 10/31/2001	
DISTANCE: Y-LINE = 150FT	
ANALYSIS PREPARED BY: JBS	
ANALYSIS CHECKED BY: BR	
DIAGRAM PREPARED BY: JBS	
DIAGRAM REVIEWED BY: ST	
SCALE: NOT TO SCALE	
DATE: 7-18-2007	
LOG NUMBER: SS# 10-01-200	

N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH



SR 5700
Tom Short Road
45 MPH



SR 3626
Ballantyne Commons Pkwy
45 MPH

New
Signalized
Intersection

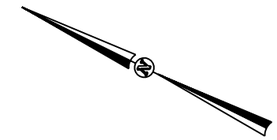
LEGEND

MOVING VEHICLE
PEDESTRIAN
PARKED VEHICLE
PARKING VEHICLE
FIXED OBJECT
HEAD ON
REAR END
RAN OFF ROAD

ANGLE
TURNING
BACKING
SIDESWIPE
OUT OF CONTROL
INJURY
FATALITY

9 MPH OR LESS
10 MPH TO 19
20 MPH TO 29
30 MPH TO 39
40 MPH TO 49
50 MPH TO 59
60 MPH TO 69
70 AND UP
SPEED UNKNOWN

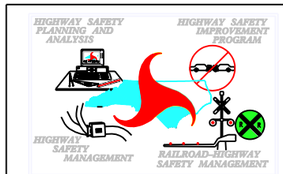
P PEDESTRIAN
T TRAIN
* DRIVER AT FAULT
D DRY
W WET
I ICY OR SNOWY
O OILY



SS# 10-01-200
Mecklenburg County
After Period
5/1/02 - 12/31/06
Ballantyne Commons
at Tom Short

(#) Target Crashes

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT



COLLISION DIAGRAM	
DIVISION: 10	AREA:
STUDY PERIOD: 5/1/2002 TO 12/31/2006	
DISTANCE: Y-LINE = 150FT	
ANALYSIS PREPARED BY: JBS	
ANALYSIS CHECKED BY: BR	
DIAGRAM PREPARED BY: JBS	
DIAGRAM REVIEWED BY: ST	
SCALE: NOT TO SCALE	
DATE: 7-18-2007	
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